



NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION



Science On a Sphere (SOS)
Help in visualizing global systems

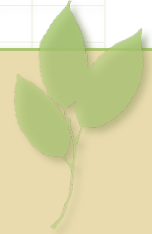
Tony P. Murphy, Ph.D.
NSTA 2011



ST. CATHERINE
UNIVERSITY



A STEM Certificate at SCU



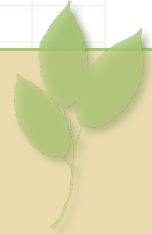
1. All elementary education majors at SCU are required to complete a STEM Certificate
2. The 3 courses are co-taught (STEM and Education faculty), rigorous and open to all majors; each has a lab; meets the science requirement for all non-STEM majors; majors can continue with 2 additional courses for a STEM minor



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

A STEM Certificate at SCU

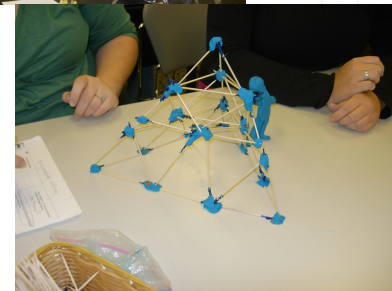


The 3 courses are

BIOL 1100 Environmental Biology

CHEM 1000 Chemistry of Life

PHYS 1200 Engineering in Your World



ST. CATHERINE
UNIVERSITY

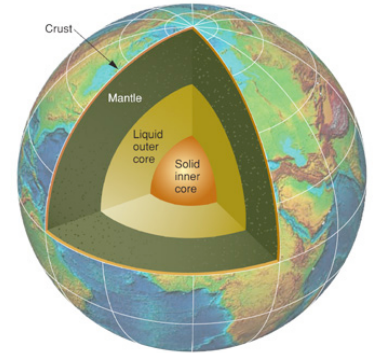
STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

A STEM Minor at SCU

The 2 additional courses are

CHEM 2150 Environmental Science: A Path to Sustainability

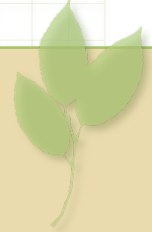
PHYS 2994 Changemakers: Physics, Engineering and Our Dynamic Earth



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Environmental Biology



3 Modules: Dr. Jill Welter, Biology; Murphy, Education

What is Science? (Evolution as a case study of theory development; environmental examples)

Minnesota and the Gulf of Mexico Dead Zone

Climate Change (Science on a Sphere)



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Integrating SOS into course



What is Science on a Sphere (SOS)?

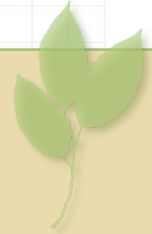
Science On a Sphere (SOS), a NOAA data visualization tool, can be used to help students understand global systems in an exciting, and vibrant way. NOAA, NASA and others are creating visualizations that can bring global systems to life for undergraduate students.



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Integrating SOS into course



What is Science on a Sphere (SOS)?

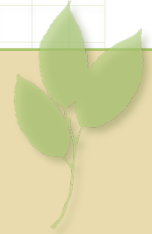
[NOAA SOS video](#)



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Integrating SOS into course



How do we integrate SOS into the course?

Use at the end of Module 3: Climate Change

Focus on global systems and linking 3 modules

Located in Science Museum of Minnesota

Has wireless access

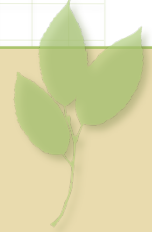
Students use MacBooks to complete lab



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Integrating SOS into course



Students download a lab sheet from Blackboard
[Lab sheet](#) has a sequence of visualizations,
questions and websites for the students to visit

Instructors interpret visualizations for a basic
understanding

Students work in pairs to complete the lab sheet



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

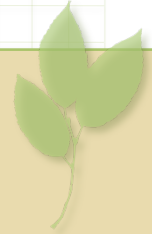
Integrating SOS into course



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Integrating SOS into course



Example of Visualization:

[Sea Currents](#)

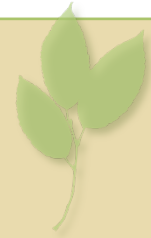
[Air Traffic](#)



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Assessment of SOS into course



Majors were asked to complete a short evaluation of the experience at the museum

Questions focused on the visualizations, and the process used in the lab

Majors could also add comments about the visualizations and the process



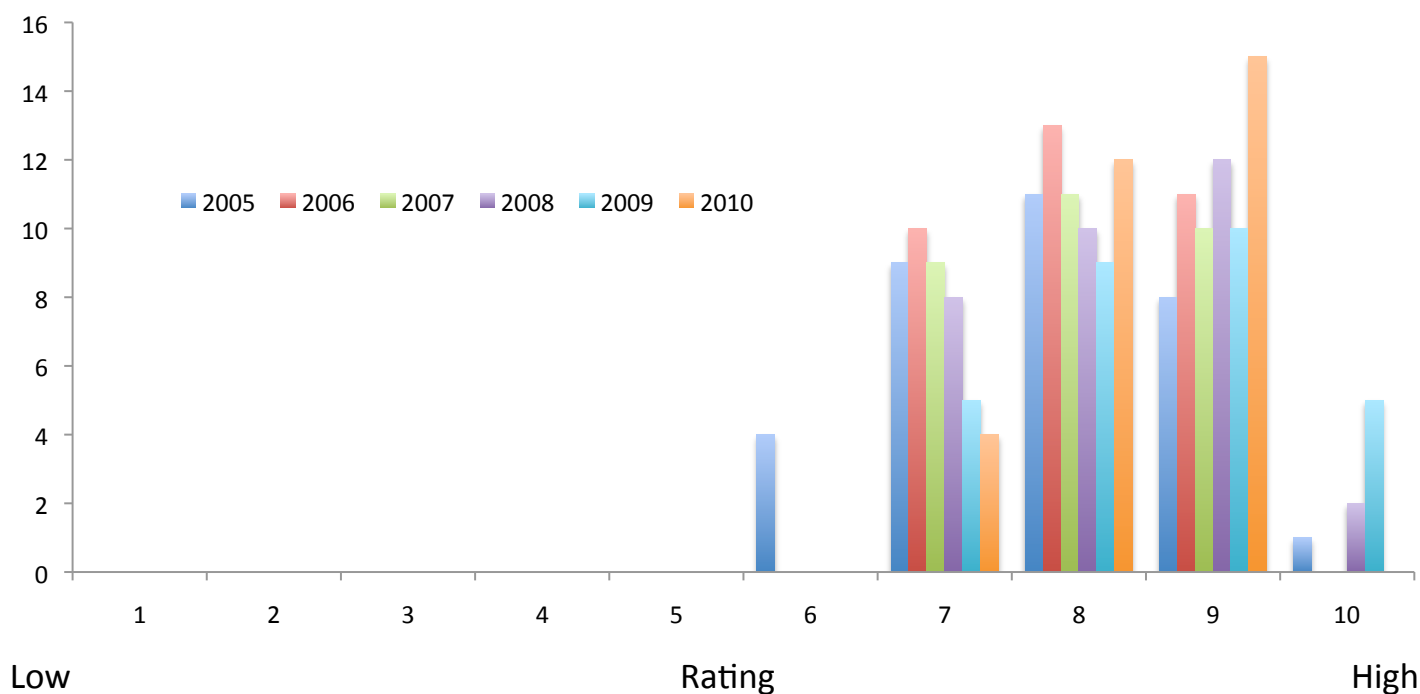
ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Assessment of SOS into course



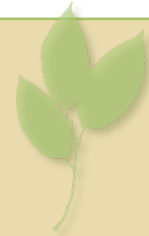
Majors' overall value of using SOS



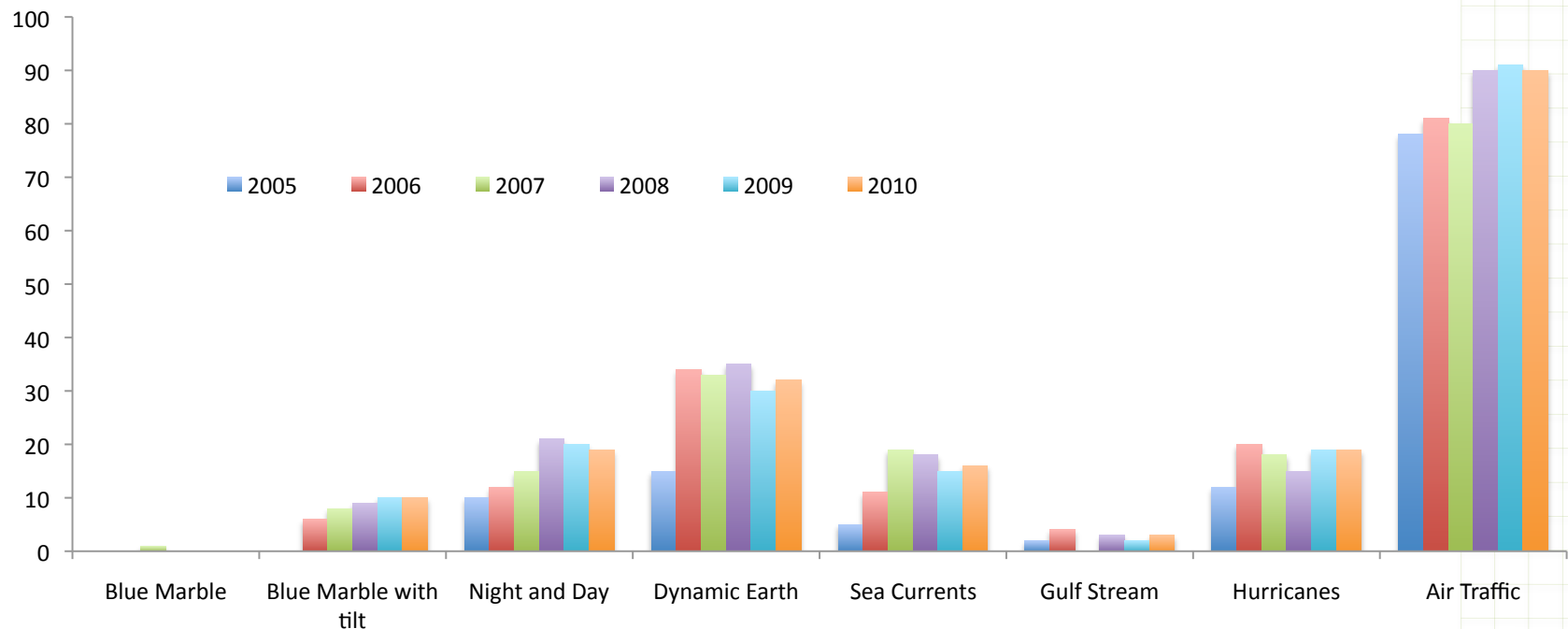
ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Assessment of SOS into course



Majors' perceived value of using SOS visualizations



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Assessment of SOS into course



Majors' comments about using SOS visualizations

Specific visualizations: Air Traffic

"I had no idea that there were so many planes flying everyday." "Awesome but a little troubling."

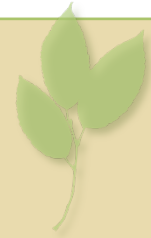
"My goodness, how much fuel is used in this everyday." "Seeing the waves between US and Europe was cool." "The large amounts of planes cause large number of GHG emissions."



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Assessment of SOS into course



Majors' comments about using SOS visualizations

Specific visualizations: Dynamic Earth

“Cool, seeing the green-up and dying back.”

“Really helped me see seasons.”

“Cool way of seeing the seasons.....impact on the environment.”



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Assessment of SOS into course



Majors' comments about using SOS visualizations

Question: Did SOS help in your understanding of systems on a global scale?

“Helped me understand impact of different issues on the world.”

“You get to see both sides of the earth.”

“It helped give a better visual for me. I am a visual learner.”



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Assessment of SOS into course



Challenges

Cost of museum entry

Wireless systems: SCU Blackboard and SMM interface

Majors' comment about the process

- Too many questions on sheet

- Too much time writing and not enough exploring the exhibit

- Visit the rest of the museum



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

SOS Resources



[List of SOS locations](#)

[NOAA](#)

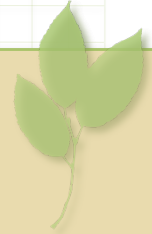
Similar Exhibit: [Magic Planet](#)



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION

Learn More



On the web: STEM.stkate.edu
By e-mail: stem@stkate.edu
By phone: 800.945.4599

Contact: Tony P. Murphy
Email: apmurphy@stkate.edu
Phone: 651-690-8877



ST. CATHERINE
UNIVERSITY

STEM NATIONAL CENTER FOR STEM
ELEMENTARY EDUCATION